OpenCMISS-iron examples and tests used by *OpenCMISS* developers at University of Stuttgart, Germany

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1 INTRODUCTION

This document contains information about examples used for testing *OpenCMISS-iron*. Read: How-to[1] and [1].

1.1 Cmgui files for cmgui–2.9

1.2 Variations to consider

- Geometry and topology

  Dimensions

  Extents

  Number of elements

  Interpolation order

  Generated or user meshes

  quad/hex or tri/tet meshes

- Initial conditions

- Load cases

  Dirichlet BC

  Neumann BC

  Volume force

  Mix of previous items

- Sources, sinks

- Time dependence

  Static

  Quasi-static

  Dynamic

- Material laws

  Linear

  Nonlinear

- Material parameters, anisotropy

- Solver

  Direct

  Iterative

- Test cases

  Numerical reference data

  Analytical solution

- A mix of previous items

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1 https://bitbucket.org/hessenthaler/opencmiss-howto

1.3   Folder structure

TBD..

2   HOW TO WORK ON THIS DOCUMENT

In this section, indicate what you are working on or if a given example was finished

- no mark: to be done

- x: currently working on it

- xx: done

Initials	Full name
EA	Ekin Altan
CB	Christian Bleiler
AH	Andreas Hessenthaler
TK	Thomas Klotz
AK	Aaron Krämer
BM	Benjamin Maier
SM	Sergio Morales
MM	Mylena Mordhorst
HS	Harry Saini

Table 1: Initials of people working on examples, in alphabetical order (surnames).

Progress	Initials	Name of example	Dimensions	Equation	Boundary conditions	Mesh type	Interpolation order
x	AH	Example-0001	3D	Laplace	Dirichlet	generated	linear
		Example-0002					
		…					

Table 2: Example-0001 to example-0099. Who is doing what? What is finished? See Table 1.

Progress	Initials	Name of example	Dimensions	Equation	Boundary conditions	Mesh type	Interpolation order
		Example-0101					
		Example-0102					
		...					

Table 3: Example-0101 to example-0199. Who is doing what? What is finished? See Table 1.

3 DIFFUSION EQUATION

3.1 Equation in general form

$$\partial_t u + \nabla \cdot \nabla u = f \tag{1}$$

3.2 Example–0001

3.2.1 *Model*

We solve the following equation,

$$\nabla \cdot \nabla u = 0 \qquad \Omega \in [0,2] \times [0,1] \times [0,1], \tag{2}$$

with boundary conditions

$$u = 0 \qquad x = y = z = 0, \tag{3}$$
$$u = 0 \qquad x = 2, y = z = 1. \tag{4}$$

No material parameters to specify.
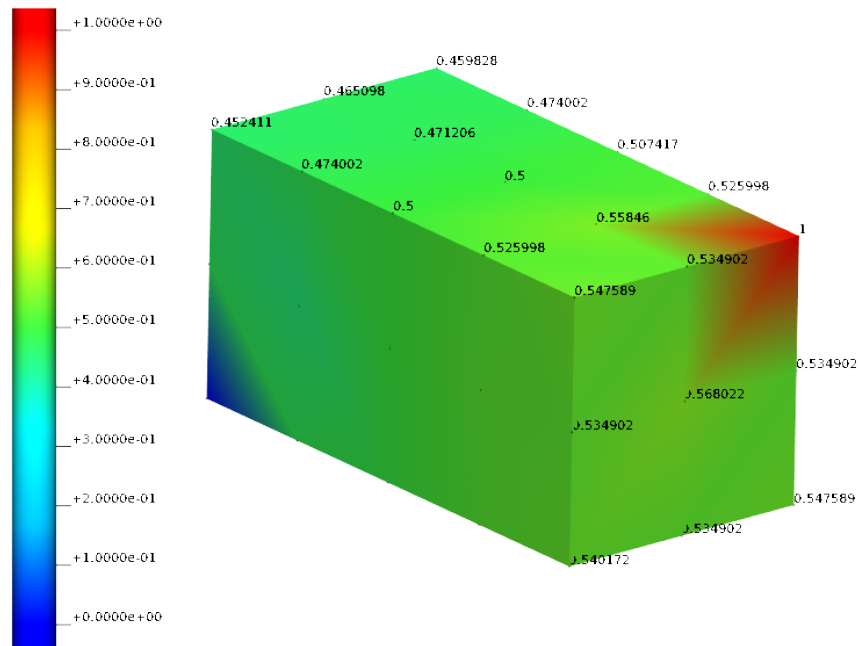
3.2.2 *Results*

Figure 1: Results.

4 LINEAR ELASTICITY

5   FINITE ELASTICITY

6 NAVIER–STOKES FLOW

REFERENCES

[1] Chris Bradley, Andy Bowery, Randall Britten, Vincent Budelmann, Oscar Camara, Richard Christie, Andrew Cookson, Alejandro F Frangi, Thiranja Babarenda Gamage, Thomas Heidlauf, et al. Opencmiss: a multi-physics & multi-scale computational infrastructure for the vph/physiome project. *Progress in biophysics and molecular biology*, 107(1):32–47, 2011.